

Research Article

Psychological Impact of a “Health-at-Every-Size” Intervention on Weight-Preoccupied Overweight/Obese Women

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The aim of the present study was to assess the impact of a “Health-at-every-size” (HAES) intervention on psychological variables and body weight the weight-preoccupied overweight/obese women. Those women were randomized into three groups (1) HAES, (2) social support (SS), (3) waiting-list (WL), and were tested at baseline, post-treatment and six-month and one-year follow-ups. All participants presented significant psychological improvement no matter if they received the HAES intervention or not. However, even if during the intervention, the three groups showed improvements, during the follow up, the HAES group continued to improve while the other groups did not, even sometimes experiencing some deterioration. Furthermore, in the HAES group only, participant’s weight maintenance 12 months after the intervention was related to their psychological improvement (quality of life, body dissatisfaction, and binge eating) during the intervention. Thus, even if, in the short-term, our study did not show distinctive effects of the HAES intervention compared to SS and WL on all variables, in the long-term, HAES group seemed to present a different trajectory as psychological variables and body weight are maintained or continue to improve, which was not the case in other groups. These differential long-term effects still need to be documented and further empirically demonstrated.

1. Introduction

Traditional weight-control treatments, mainly based on dietary restriction and physical activity prescription, identify weight loss as the key component of the intervention’s success [1]. Yet, most individuals who lose weight cannot sustain the prescribed dietary and/or physical activity changes over time. One possible explanation might be that, restrictive dieting, which is associated with short-term weight loss, has also been related to increases in appetite sensations [2], higher frequency of obsessive thoughts about food and eating [3], greater risk of depression [4], and overeating [3], all of these behavioral and psychological factors being in turn, associated with long-term weight regain [5], thus creating a

vicious circle. In addition, for most individuals, particularly women, failure to achieve or maintain weight loss goals results in subsequent psychological impairment: decreases in self-esteem, increases in body dissatisfaction, feelings of helplessness, among others, have all been documented [6].

Accordingly, a different paradigm, the “Health-at-every-size” paradigm (HAES), proposes a philosophy that emphasizes psychological processes and global health rather than weight loss [5, 7–10]. Interventions based on this paradigm may vary on specific aspects, but share some core characteristics. The HAES paradigm, characterized by its nondieting philosophy, proposes to optimize psychological as well as physical health at any weight. It informs people about problems associated with repeated dieting and promotes

diminution of restraint to achieve a more serene relation with food. In accordance, it encourages the construction of a positive body image as well as the reduction of weight preoccupation.

Up until now, initial descriptive [11–19] and further controlled comparisons studies [20–30] have demonstrated that HAES interventions appear to improve the psychological profile of participants on aspects such as dysphoria [21, 22, 27–29], self-esteem [21, 23, 28, 29] and body dissatisfaction [21–23, 25, 27, 30]. Most of these studies showed that psychological improvements were maintained at follow-up [11, 16, 21, 22, 24, 27–29]. Concerning body weight changes, many HAES studies have revealed no or little weight loss [21, 23, 25, 30] but some of them suggest that weight could be maintained in a longer term compared to traditional programs [14, 18, 28, 29].

Although those important studies yield encouraging evidences supporting the HAES paradigm, some methodological reasons support the importance of pursuing the empirical evaluation of the HAES interventions. First, among studies evaluating the HAES interventions, some have proposed a design in which HAES is not compared to any other condition [11–19]. Although those studies confirm that participants involved in an HAES intervention showed significant improvement over time, it cannot be concluded that this improvement can be attributed to the intervention *per se*. Interestingly, it has been proposed that weight-preoccupied participants who are assigned to a no-intervention control group usually undertake some kind of action by themselves, such as engaging in a diet program [21, 31]. It therefore appears to be of great importance to compare an HAES intervention to a randomized no-intervention control group in order to compare such an intervention to what individuals can do on their own.

Second, other studies have chosen to compare HAES intervention to a standard dieting intervention [21, 22, 24, 27–29]. Results have revealed that participants involved in HAES intervention showed greater improvement in psychological parameters such as dysphoria and anxiety than those involved in dieting interventions [29]. On the other side, participants involved in dieting treatments lose more weight throughout the intervention than participants in the HAES interventions [22, 27, 28]. Likewise, restraint scores were shown to be reduced by an HAES intervention and increased by a dieting intervention [22]. Considering that dieting and nondieting interventions promotes different treatment goals (weight loss versus well-being independently of weight loss) and strategies (increasing dietary restraint versus internalizing cues of hunger and satiety), those results mostly underline that both treatments effectively impact on their own respective targets. However, they do not inform us about the active mechanisms implied in changes during an HAES intervention. Interestingly, all the studied HAES interventions have been delivered in a group format, and the implication of the social support provided by the group setting has never been considered in the interpretation of the participants' improvement. It is yet well documented that social support has a significant impact on changes in weight management programs [22, 23, 25, 32]. It would

thus be interesting to compare an HAES intervention with a nonspecific support group that would address similar themes. Such a design would clarify the added value of the specific HAES component.

In addition, even if weight loss is not a direct objective of HAES interventions, most studies have documented body weight changes following the intervention [14, 21, 23, 25, 28–30]. However, to our knowledge, none of them has examined the potential relationship between psychological changes during the intervention and body weight after the intervention. Therefore, it is relevant to document how improvement of self-esteem, self-acceptation, and reduction of problematic eating behaviors such as restraint and binge eating may be related to long-term body weight, even if not intentionally targeted by the intervention.

Taken all together, these observations make it clearly relevant (1) to compare an HAES intervention to both a social support group (SS) and a no-intervention control group (waiting-list: WL), on psychological variables and body weight among weight-preoccupied overweight/obese women, and (2) to examine the potential relationship between psychological changes during the intervention and body weight after the intervention." Effects on physiological variables, as well as on eating and behavioural manifestations have been reported elsewhere [33, 34]. For the first objective, it was hypothesized that changes in psychological variables (depressive symptoms, self-esteem, body dissatisfaction, quality of life, and binge eating) observed in the HAES group would be significantly greater than changes observed in the SS group and the WL group in the short-term (from baseline to posttreatment) as well as in the long-term (from posttreatment to 12-month follow-up). For the second objective, no formal hypothesis has been formulated.

2. Method

2.1. Participants. Participants were premenopausal women recruited through different media in the Quebec City metropolitan area inviting weight-preoccupied overweight/obese women who had undertaken numerous unsuccessful attempts to lose weight to participate in a health-centered intervention. A total of 194 women were met for a screening interview, 144 of them were accepted to take part to the study based upon the following criteria and completed at least the baseline testing and, finally, 107 participants terminated the study protocol. To be part of the study, women had to be preoccupied about their weight and eating, based upon criteria defined by Grodner [35]: (1) showing over concern with shape and weight, (2) exhibiting restriction over food choices for at least two years, and (3) having been unsuccessful in previous attempts to lose weight (for at least the past two years). Although half of the sample (50.33%) have been previously involved in five diets or more, most of the participants had made at least three attempts to lose weight in the past (70.33%). All women included in this study were overweight or obese (body mass index (BMI) between 25 to 35 kg/m², mean BMI of 30.46 ± 3.03 kg/m²), and had a stable weight for a minimum of

2 months prior to the beginning of the study. Otherwise, all participants were not taking oral contraceptives, were not pregnant or lactating, were not displaying metabolic disorders, and were not under pharmacological treatment for coronary heart disease, diabetes, dyslipidemia or endocrine disorders (except stable thyroid disease). Moreover, self-reported questionnaires were used to screen the presence of depression or eating disorders (anorexia and bulimia). The Beck Depression Inventory and the Eating Disorder Examination—Questionnaire were administered at screening and participants displaying significant level of depression, compensatory behaviours or anorexic-like restriction scores were phoned by a clinical expert in the eating disorders field (C.B.) to rule out any diagnosis of major depression, anorexia nervosa or bulimia.

Participants were aged from 28 to 51 years at baseline (mean age of 42.4 ± 5.6 yrs) and were all Caucasian (with the exception of one woman). Table 1 shows baseline demographic data for the total sample of participants who completed baseline testing ($n = 144$).

2.2. Procedure. The present study was a randomized controlled trial (RCT) in which participants were recruited during four equal phases of testing and intervention (September 2003, January 2004, September 2004, and January 2005). Prior to their participation, each woman signed an informed consent document which was approved by the Laval University Research Ethics Committee. Participants were randomly assigned to one of the three treatment conditions (1) HAES group intervention ($N = 48$), (2) social support group intervention (SS) ($N = 48$), and (3) waiting-list (WL) ($N = 48$). Participants were notified of the randomization in the informed consent but were not randomized until baseline data were obtained. Thus, outcomes assessors were blinded of the group assignment at baseline but not of the other testing times. Interventions were conducted for four months. Only one of the outcome assessors was involved in both data collection and treatment provision. Measures were taken at baseline ($T = 0$), at the end of the intervention period ($T = 4$) as well as six months ($T = 10$), and one year ($T = 16$) after the intervention. Questionnaires were self-administrated whereas weight and height were measured by a member of the research team.

2.3. Treatment Conditions. The HAES intervention was a 14-week group program named *Choisir de Mairir?* (“What about losing weight?”; see <http://www.equilibre.ca> for more details) which focuses on global health through the exploration of a more satisfying lifestyle and the appropriation of internal cues of hunger and satiety to replace external controls of eating such as counting calories or restricting specific food intake. The program aimed at enhancing awareness and knowledge about biological, psychological, and sociocultural aspects of health and body weight. Sessions were conducted in small groups of 12 women and were led by the same trained registered dietician and clinical psychologist for each phase to reduce bias. Different themes

such as enjoyment of physical activity and healthy nutrition, recognition of internal cues of hunger and satiety, identification of external influences on eating behaviors and food intake, and acceptance of one’s own and others’ body image were addressed through guided self-reflection and observations, group discussions, practical exercises, and lectures. At the end of the program, participants were asked to choose a personal objective and to design and present their own action plan in line with this objective. In the HAES group, the interveners were active leaders, providing specific information, structured activities, and counselling to participants.

The social support (SS) condition was designed to isolate the social support component involved in group interventions such as the HAES intervention. The SS condition was therefore designed to be similar to the HAES group in regard to the format (groups of 12 women over 14 weeks) and themes. The main goal of the SS intervention was to reproduce the structural social support provided by the group itself, as it can be observed in a group setting. However, the dietician and the psychologist were not providing any specific verbal or printed information or structured activities to participants and never tried to influence the content and direction of the discussion. Each theme discussed in the HAES group was discussed in the SS group in the same order, but women were asked to discuss on their own, so that the health professionals were only there to facilitate the discussion. The professionals involved in those groups were the same as for the HAES intervention to avoid bias. Each HAES and SS session was videotaped, and investigators of the study (S.L., C.B.) verified the specificity of each condition.

The participants on the waiting-list were asked to follow their lifestyle habits as usual and were not in contact with the research team except for the four testing sessions, which took place at the same period as for the two other groups. At the end of the one-year follow-up period, participants on the waiting-list received the HAES intervention.

2.4. Measures

2.4.1. Body Weight. Anthropometric measures (weight and height) were determined according to standardized procedures, as recommended at the Airlie Conference [36].

2.4.2. Body Satisfaction. Three factors of body esteem (Appearance, Weight, and Attribution) were measured by the Body-Esteem Scale (BES [37]). Validity assessment of this 23-item questionnaire showed very high internal consistency coefficients ($\alpha = 0.92, 0.81, \text{ and } 0.94$) and good temporal stability for each scale after three months ($\alpha = 0.89, 0.92, \text{ and } 0.83$).

2.4.3. Depressive Symptoms. The Beck Depression Inventory is a 21-item questionnaire that measures depressive symptoms (BDI [38]). The BDI presents good internal consistency ($\alpha = 0.81$ in a nonpsychiatric population) and a high concurrent validity, particularly with the Hamilton Psychiatric Rating Scale for Depression ($r = 0.74$) and clinical

TABLE 1: Baseline characteristics of the total sample and differences between HAES, SS, and WL groups.

	Total sample (<i>n</i> = 144)	Difference between HAES, SS, and WL groups (<i>P</i> statistic)
BMI		
M	30.47	0.560
SD	3.02	
Range	24.9–37.6	
Weight (kg)		
M	80.54	0.357
SD	9.60	
Range	57.7–106.5	
Waist circumference (cm)		
M	93.71	0.254
SD	8.31	
Range	76.8–117.8	
Maximum weight (kg)		0.373
M	83.22	
SD	9.70	
Range	60.9–109.9	
Minimum weight (kg)		0.874
M	57.37	
SD	7.16	
Range	34.1–75.5	
Age (years)		
M	42.42	0.907
SD	5.61	
Range	28–51	
Number of diets		0.241
M	3.41	
SD	1.83	
Range	0–5	
Education level (%)		
No scolarity	0	
Primary school	0	
Secondary school	20.3	
College	28.1	
University	51.6	
Income (%)		
0–19 000\$	3.9	
20 000–39 999\$	22.9	
40 000–59 999\$	17.6	
60 000–79 999\$	19.0	
More than 80 000\$	32.7	
Living situation (%)		
With spouse	13.7	
With spouse and children	60.8	
With children only	12.4	
With other persons	2.0	
Alone	11.1	

judgement ($r = 0.60$) [39]. The BDI is the most commonly used instrument to measure depressive symptoms, with a cut-off point of 20. This instrument is suggested to tap a broader construct of negative affectivity and is widely used for that purpose. Depressive symptoms were measured only at baseline ($T = 0$), posttest ($T = 4$), and one-year follow-up ($T = 16$).

2.4.4. Self-Esteem. Self-esteem was assessed with the Culture-Free Self-esteem Inventories [40], a 39-item inventory with dichotomized answers (yes or no). Three scales can be derived: general self-esteem (general perception of one's own value), social self-esteem (perception of one's own value in relation with others), personal self-esteem (intimate perception of one's value) together with a total score and a lie scale. Good temporal stability coefficients are observed ($\alpha = 0.81$) [40].

2.4.5. Quality of Life. The Impact of Weight on Quality of Life (IWQOL [41]) is a 31-item questionnaire that measures quality of life related to weight on a 5-point scale. Five scales can be derived: physical function, self-esteem, sexual life, public distress, and work. The IWQOL shows high internal consistency ($\alpha = 0.96$ for total score, α s = 0.82 to 0.94 for scales) and satisfying convergent and discriminant validity [42]. The IWQOL is the most commonly used instrument to measure weight-related quality of life.

2.4.6. Binge Eating. Binge eating was assessed by the widely used Binge Eating Scale (BES [43]). This 16-item questionnaire describes both the behavioral (objective) and cognitive (subjective) manifestations of bulimic behaviors among obese individuals. Results of studies have demonstrated that the BES effectively discriminate severe binge eaters from moderate binge eaters and nonbinge eaters as diagnosed by clinical interviews. A study has shown that the BES has a sensitivity value of 0.85 and a specificity value of 0.20, suggesting that this instrument is efficient in the identification of the occurrence of binge eating presence, but presents a weaker performance for the identification of individuals who do not present binge eating behaviors [44].

2.5. Data Analysis. All analyses were performed with the SAS statistical software (version 8.2), using an alpha level of 5%. Analyses were conducted in all participants for whom baseline data were available. Based on the recommendations of Ware [45], we choose to conduct a baseline-carried-forward analysis, a conservative intent-to-treat analysis which assumes that participants who dropped out of study may be likely to return to their baseline score. Data from participants who withdrew during the intervention period (HAES and SS participants), but who came for testing visits on a voluntary basis, were also included in the statistical analyses. A Student t -test analysis was performed to assess differences for all variables measured at baseline between women who completed testing $T = 16$ months (i.e., completers, $N = 107$) and women who did not complete

testing at $T = 16$ months (i.e., noncompleters who were lost at follow up, $N = 37$) as well as baseline differences between groups. All variables studied were entered into linear mixed models according to a group (3: HAES versus SS versus waiting-list) by time (4: baseline, posttest 4-months, six-month follow-up, one-year follow-up) split-plot design. The mixed model approach has been recommended for repeated measures designs with missing data [46]. Short-term and follow-up *a priori* specific hypotheses were tested with simple effects and contrast-contrast interactions to assess whether changes in the HAES group were significantly different from changes in the other groups for dependent variables. To control for inflation of alpha error, the corrected alpha was set at 0.025 according to the simultaneous test procedure [47]. To further address whether body weight variation was related to changes in psychological variables, Pearson's correlational analyses were performed on these variables among the HAES, SS, and WL groups separately. Standard linear regressions predicting body weight variation were conducted only among the groups where body weight variation was correlated to changes in psychological variables.

3. Results

3.1. Descriptive Statistics. Baseline characteristics such as age, body weight, and BMI were similar for women of the three groups (HAES, SS, and WL) as shown in Table 1. Similarly, completers ($N = 107$) and noncompleters ($N = 37$) were not significantly different at baseline for these characteristics. Means and standard errors for depressive symptoms, self-esteem, quality of life, body dissatisfaction, binge eating, and body weight are computed on Table 2 for baseline ($T = 0$), posttreatment ($T = 4$), and follow-up visits ($T = 10$ and $T = 16$).

3.2. Main and Simple Effects. Based on the linear mixed model (group by time), main effects of group were not significant for all variables, meaning that participants did not significantly differ according to their attribution's group.

Main effects of time were observed for depressive symptoms, $F(2, 249) = 7.92, P = .0005$, self-esteem, $F(3, 402) = 10.99, P < .0001$, quality of life, $F(3, 390) = 14.14, P < .0001$, body dissatisfaction—appearance, $F(3, 401) = 24.78, P < .0001$, body dissatisfaction—weight, $F(3, 401) = 20.92, P < .0001$, body dissatisfaction—attribution, $F(3, 401) = 3.69, P = .0120$, binge eating, $F(3, 400) = 14.38, P < .0001$, and body weight, $F(3, 405) = 6.37, P = .0003$, indicating that time had a significant effect on all participants for those variables. More precisely, as shown in Table 2, simple effects of time suggest that all psychological variables were significantly improved in all three conditions, except for depressive symptoms and binge eating that were not significantly improved among the waiting list group. Otherwise, decrease in body weight over time (-1.4 kg or 1.8% of the initial weight) was significant only in the HAES group and not in the SS and WL groups.

However, no group by time interaction effect was significant, meaning that all participants showed significant

TABLE 2: Psychological profile and body weight at baseline ($T = 0$), posttreatment ($T = 4$), follow-up visits ($T = 10$ and $T = 16$) in HAES, SS and WL groups.

	$T = 0$		$T = 4$		$T = 10$		$T = 16$		Simple time effects
	N	Mean (SE)	N	Mean (SE)	N	Mean (SE)	N	Mean (SE)	
Body weight									
HAES	48	78.84 (1.34)	47	77.41 (1.36)	48	77.31 (1.34)	48	77.45 (1.34)	4.76 (3,405) **
SS	45	81.03 (1.39)	44	80.39 (1.39)	45	80.11 (1.39)	32	80.39 (1.40)	1.29 (3,405)
WL	46	80.77 (1.37)	46	80.42 (1.37)	46	79.68 (1.37)	34	80.59 (1.37)	1.98 (3,405)
BDI									
HAES	47	9.39 (1.05)	39	7.25 (1.10)	0	N/A	47	7.48 (1.05)	3.06 (2,249)*
SS	45	8.69 (1.08)	38	5.92 (1.13)	0	N/A	45	8.61 (1.08)	4.87 (2,249)**
WL	46	9.41 (1.06)	42	7.59 (1.09)	0	N/A	45	7.96 (1.07)	2.07 (2,249)
CFSEI									
HAES	48	28.63 (0.80)	47	30.10 (0.80)	46	30.38 (0.81)	48	30.56 (0.80)	5.94 (3,402)***
SS	45	29.27 (0.83)	44	30.55 (0.83)	44	30.64 (0.83)	45	30.51 (0.83)	3.04 (3,402)*
WL	46	28.58 (0.81)	46	29.56 (0.82)	45	29.99 (0.82)	46	29.67 (0.82)	2.69 (3,402)*
IWQOL									
HAES	48	76.21 (1.80)	47	78.83 (1.80)	45	79.67 (1.81)	48	80.82 (1.80)	6.80 (3,390)***
SS	43	78.15 (1.87)	42	81.07 (1.87)	42	81.34 (1.87)	43	79.92 (1.87)	3,28 (3,390)*
WL	46	76.56 (1.84)	45	79.41 (1.84)	45	81.50 (1.84)	44	79.36 (1.84)	6.93 (3,390)***
Binge eating									
HAES	48	13.70 (1.01)	47	10.36 (1.01)	46	10.64 (1.02)	46	10.40 (1.04)	9.78 (3,400)***
SS	45	12.75 (1.04)	44	11.21 (1.04)	44	10.15 (1.04)	45	10.79 (1.04)	4.27 (3,400)**
WL	46	12.99 (1.03)	46	11.36 (1.03)	45	11.08 (1.03)	46	11.79 (1.03)	2.55 (3,400)
BES Appear.									
HAES	48	1.31 (0.09)	47	1.58 (0.09)	45	1.64 (0.09)	48	1.73 (0.09)	16.99(3,401)***
SS	45	1.34 (0.09)	44	1.52 (0.09)	44	1.61 (0.09)	45	1.53 (0.09)	6.57 (3,401)***
WL	46	1.45 (0.09)	46	1.62 (0.09)	45	1.68 (0.09)	46	1.62 (0.09)	4.89 (3,401)**
BES Weight									
HAES	48	0.87 (0.08)	47	1.16 (0.08)	45	1.17 (0.08)	48	1.27 (0.08)	12.57(3,401)***
SS	45	0.82 (0.09)	44	1.04 (0.09)	44	1.12 (0.09)	45	1.02 (0.09)	6.47 (3,401)***
WL	46	0.96 (0.08)	46	1.08 (0.08)	45	1.23 (0.08)	46	1.14 (0.08)	5.23 (3,401)**

* $P < .05$; ** $P < .01$; *** $P < .0001$.

improvement no matter the type of intervention they received.

3.3. Differences in the Long-Term Trajectories. Even if no significant group by time interaction was evidenced by the mixed model procedure, the HAES group seemed to present a different trajectory than the two other groups, mainly after the end of the intervention. Indeed, during the intervention phase ($T = 0$ to $T = 4$), the three groups showed similar improvement on all variables. However, for the follow-up phase ($T = 4$ to $T = 16$), only the HAES group continued to improve or maintained previous gains whereas the SS and the WL groups experienced some deterioration or no further improvement. These observations were illustrated through the analyses of percentage of change and graphical representations of scores. Contrast-contrast interactions were also used to quantitatively measure significant differences in trajectories since contrast-contrast interactions compared the amplitude of change in particular intervals for two different groups. As expected, considering the absence of

significant group by time interaction effect, only some contrast-contrast interactions were significant.

For the intervention phase ($T = 0$ to $T = 4$), percentages of change were positive for the three groups, meaning that all participants were improving, as shown in Table 3. As well, Figures 1 and 2 illustrate that the three groups responded by a similar improvement on all variables. Consequently, no contrast-contrast interactions were found significant.

Concerning the follow-up phase ($T = 4$ to $T = 16$), for the HAES group, percentages of change stayed positive, clearly showing that, for the interval between the six-month follow-up ($T = 10$) and the one-year follow-up ($T = 16$), the HAES group was still improving on all psychological variables whereas for the two other groups, percentages of change became negative, showing that the other two groups were actually deteriorating on all the variables. For the same interval ($T = 10$ to $T = 16$), weight was regained for the SS and the WL groups while it remained stable for the HAES group. Likewise, Figures 1 and 2 illustrate, for the follow-up segment, the distinctive trajectories of the HAES

TABLE 3: Change during the intervention and during the follow-up as well as overall change expressed in percentage of change¹.

	Change during the intervention	Change during the follow-up		Overall change
	$T = 0-T = 4$ (%)	$T = 4-10$ (%)	$T = 10-T = 16$ (%)	$T = 0-T = 16$ (%)
Body weight				
HAES	-1.93	-0.14	0.00	-2.07
SS	-0.85	-0.46	+0.40	-0.91
WL	-0.53	-1.19	+1.53	-0.21
BDI				
HAES	-25.35	—	—	-23.32
SS	-38.36	—	—	+1.38
WL	-27.11	—	—	-27.11
CFSEI				
HAES	+5.38	+0.99	+1.44	+7.96
SS	+5.16	+0.29	-0.49	+4.95
WL	+4.27	+2.65	-1.44	+5.49
IWQOL				
HAES	+3.63	+1.14	+2.39	+7.32
SS	+4.29	+0.50	-2.00	+2.71
WL	+4.50	+3.61	-2.50	+5.58
Binge Eating Scale				
HAES	-25.69	+3.05	-7.72	-29.34
SS	-14.04	-13.50	+5.49	-21.57
WL	-15.86	-5.76	+9.22	-13.39
BES				
Appearance				
HAES	+22.13	+4.38	+7.78	+37.40
SS	+16.42	+7.69	-5.36	+18.66
WL	+13.79	+5.45	-2.30	+17.24
Weight				
HAES	+36.78	0.00	+13.45	+55.17
SS	+30.49	+10.28	-7.63	+32.93
WL	+16.67	+20.54	-7.40	+30.21

¹ Percentages of change were computed among completers only since the percentages of change for noncompleters cannot be estimated, baseline scores being attributed to all missing values (percentage of change = 0, no possibility for noncompleters to show an increase or decrease in scores).

group compared the SS and the WL groups. In that sense, some contrast-contrast interactions were found significant. Concerning binge eating scores, contrast-contrast analyses indicated a significant difference (2.00; $P = .046$) between the HAES group and WL group for the interval between pre-treatment ($T = 0$) and one-year follow-up ($T = 16$). In this interval, the HAES group exhibited greater reduction of binge eating score than the WL group. Regarding quality of life scores, contrast-contrast analyses indicated a significant difference (2.01; $P = .045$) between the HAES group and SS group for the interval between posttreatment ($T = 4$) and one-year follow-up ($T = 16$). In this interval, the HAES group presented improvement of quality of life while the SS group exhibited reduction of quality of life. Concerning body esteem appearance-related scores, improvement of greater magnitude was shown in the HAES group compared to both the SS group (2.51; $P = .013$) and to the WL group (2.78; $P = .006$) between baseline ($T = 0$) and one-year follow-up

($T = 16$). The same difference was observed for body esteem weight-related scores; improvement of greater magnitude was observed in the HAES group compared to both the SS group (1.99; $P = .048$) and to the WL group (2.29; $P = .022$) between baseline ($T = 0$) and one-year follow-up again ($T = 16$) a significant difference was shown between the HAES group and both the SS group (1.97; $P = .050$) and the WL group (1.99; $P = .047$) on body esteem weight-related scores for the interval between the six-months follow-up ($T = 10$) and the one-year follow-up ($T = 16$). In this interval, the HAES group showed improvement of body esteem while the SS and WL groups showed deterioration of body esteem. No other contrast-contrast interactions were found significant.

3.4. Associations between Psychological Changes and Body Weight Variations. Considering that all the psychological variables under study were improved during the intervention

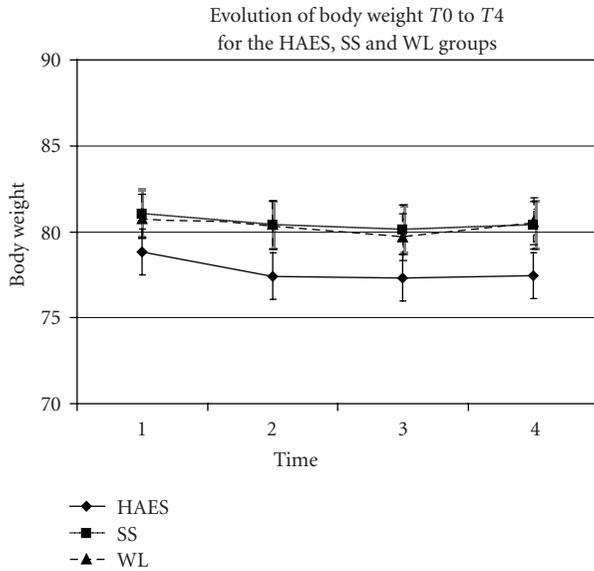


FIGURE 1: Evolution of body weight from $T = 0$ to $T = 16$ for the HAES, SS, and WL group with error bars based on standard errors.

TABLE 4: Associations between psychological changes during the intervention and body weight variation from posttreatment ($T = 4$) to 12-month follow-up ($T = 16$) in the HAES, SS, and WL group.

Psychological changes during the intervention	Body weight variation ($T = 4 - T = 16$)		
	HAES $N = 44$	SS $N = 39$	WL $N = 38$
Δ BDI	-.22	-.28	.11
Δ IWQOL	.42**	.13	.01
Δ CFSEI	.25	.00	-.06
Δ BES Appearance	.52***	.02	.08
Δ BES Weight	.03	.05	.22
Δ BES Attribution	.28	.10	-.18
Δ Binge Eating Scale	-.36*	-.22	-.07

* $P < .05$; ** $P < .01$; *** $P < .0001$.

phase for women of the three groups, correlations between psychological change during the intervention phase and weight variation after the intervention were tested, as shown in Table 4. Body weight variation was calculated as the ratio of body weight at posttreatment ($T = 4$) over body weight at the one-year follow-up ($T = 16$). Correlations between psychological changes during the intervention and weight variation at follow up showed that improvement in quality of life, body esteem related to appearance, and binge eating during the intervention phase were significantly associated to body weight maintenance at follow up but only in the HAES group. No significant correlation were found in the other two groups

To identify the best predictors of body weight maintenance among the HAES group, a regression analysis was performed, including improvement in quality of life, body esteem related to appearance, and binge eating as

independent variables. Results showed that only improvement of body esteem related to appearance throughout the intervention phase predicted body weight maintenance in the follow-up phase ($P = .011$) improvement in quality of life ($P = .313$) and binge eating ($P = .259$) were no longer significant.

4. Discussion

The present study aimed at assessing the impact of a “Health-at-every-size” intervention on psychological variables and body weight in comparison to a social support group and a waiting-list, among a sample of weight-preoccupied overweight/obese women. Although main effects of time were noted for all variables under study, no significant group by time interaction was observed meaning that the observed time effects were not attributable to the type of intervention received by the participants. In fact, most psychological variables (quality of life, self-esteem, and body dissatisfaction associated with appearance and weight) were improved for the three groups.

At first glance, these results suggest that, in the short-term, the HAES intervention did not show distinctive effects on psychological profile and body weight compared to SS and WL groups. Several factors could explain why women assigned to the social support group and the waiting list could have shown as much improvement as women engaged in the structured HAES intervention. One hypothesis is that, because of stringent exclusion criteria used to recruit women, most of them were well-educated and showed a psychological profile that reflect good emotional health, except for the presence of problematic body dissatisfaction which was considerably higher than normal for all participants. Thus, improvements, even if significant over time, were relatively small because scores of most participants were already in the normal range or near it (healthy volunteer effect). For example, mean baseline BDI scores (HAES = 9.39 ± 1.05 ; SS = 8.69 ± 1.08 ; WL = 9.41 ± 1.06) were in the normal range and were considerably lower than what has been seen in other comparable samples (e.g., mean BDI = 14.67 in Polivy and Herman [16]; mean BDI = 17.9 and 19.6 in Tanco et al. [29]). Larger improvement in the HAES intervention group may have been impossible to observe due to this floor effect. In addition, women engaged in this study may have been able to manage their own personal resources to improve their situation, whether or not they were given structured support. Moreover, nondieting principles, which were given in the HAES program, have been increasingly popular in media and nutrition books over the past years. Therefore, this information could have been available to women outside the HAES group.

However, some differences in the long-term trajectory of the three groups have been evidenced. Even if not all the contrast-contrast interactions were statistically significant, percentages of change illustrate that the HAES group present distinctive trajectories compared to the comparison groups, particularly in the long term. Indeed, for the follow up phase, results suggest that HAES participants get better or

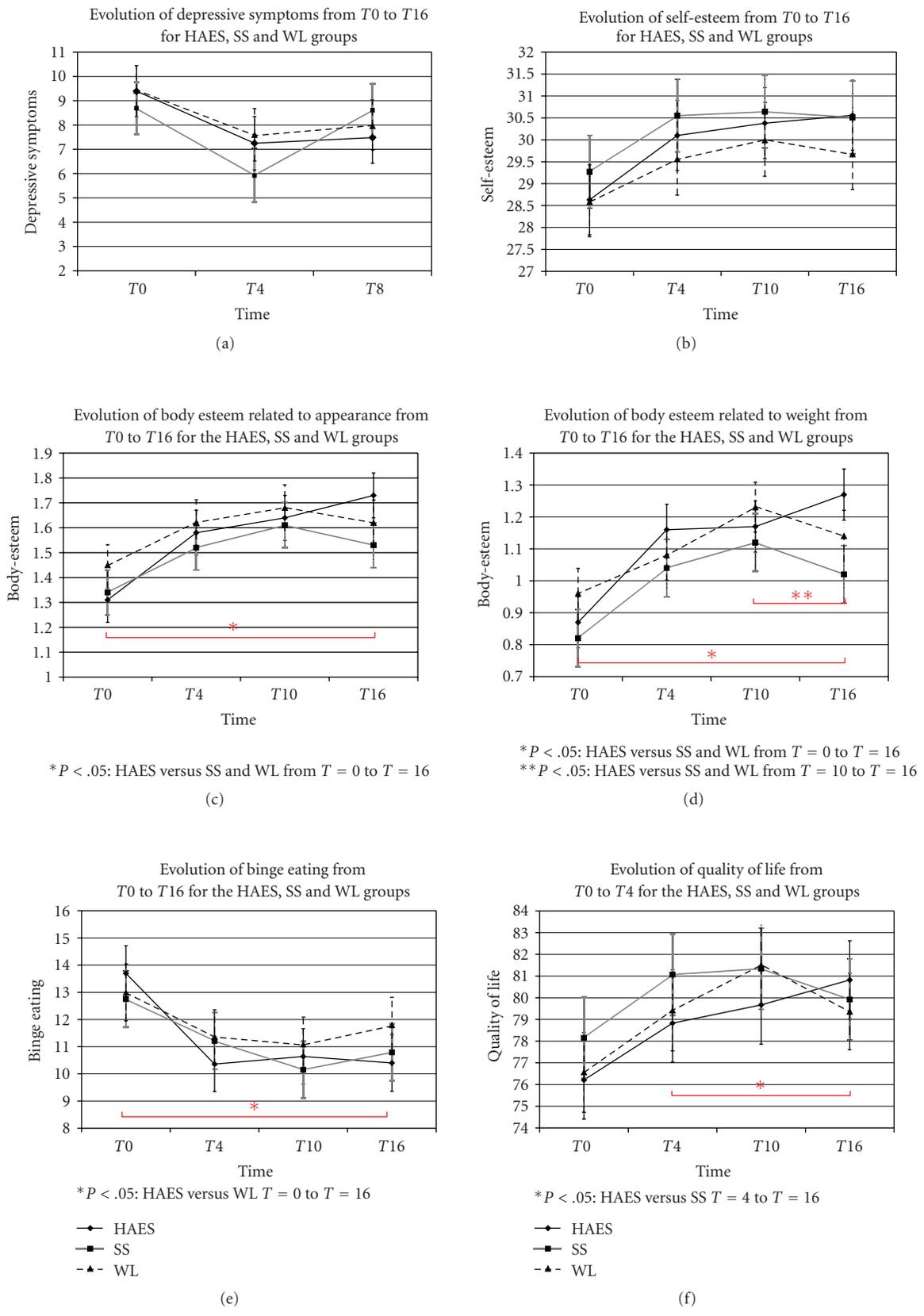


FIGURE 2: Evolution of psychological variables from $T = 0$ to $T = 16$ for the HAES, SS, and WL group with error bars based on standard errors.

at least maintain their progress whereas participants in the SS and the WL groups tend to regress based on their former improvement both on psychological variables and body weight. The HAES intervention may thus have had effects that are sustained throughout time and that are more evident in the long term, even if these changes were relatively small. Accordingly, empirical differences have been observed in the long term, mainly regarding binge eating, quality of life, and body dissatisfaction, the only variables for which contrast-contrast interactions were significant. It is interesting to note that those variables are directly targeted by the HAES intervention. It is possible that working on self-acceptance, quality of life and the construction of a positive body image takes a certain time to be fully achieved. These results are in accordance with studies suggesting that effects of an HAES intervention on psychological profile as well as on body weight may be more evident in the long term [14, 18, 28, 29].

In addition, the small weight loss observed in the HAES group (about 2%), although not significantly greater than the weight loss in the SS and the WL groups, was maintained over one year. It shows that an HAES intervention, which targets psychological and behavioural variables, seems to facilitate a greater sustainability of a slightly lower weight, which is not trivial considering that the challenge related to long-term body weight maintenance. Results of the present study support the idea that HAES interventions may facilitate body weight maintenance, although it is not a target of the intervention.

In that sense, correlational analysis have shown that body weight maintenance after the intervention is tightly related to improvement of quality of life, body esteem related to appearance and binge eating during the intervention in the HAES group. Moreover, when taking into account all these variables, improvement in body esteem seems to be the best predictor of body weight regulation. This is an interesting finding, supporting one of the fundamental assumptions of the HAES approach which claims that reduction of weight preoccupation and body dissatisfaction could lead to further improvement in weight and health management in weight-preoccupied overweight/obese women. These results also suggest that psychological and physiological changes resulting from the HAES intervention are more integrated than changes in the SS and the WL groups. Since the HAES intervention is more intense and well-elaborated, changes seem to be more coherently organized.

5. Conclusion

In conclusion, even if, in the short-term, our study did not show distinctive effects of the HAES intervention compared to SS and WL on all variables, in the long-term, HAES group seemed to present a different trajectory as psychological variables and body weight are maintained or continue to improve, which was not the case in SS and WL groups, but these long-term effects still need to be further empirically demonstrated. However, the exclusion of women presenting greater level of psychopathology (depression, anorexia nervosa, and bulimia, etc.) limits the conclusions

that can be drawn from this study because it does not inform us about the impact of such an intervention among more psychologically impaired women. Yet, since weight preoccupation and repeated dieting have been related to important psychological distress and disturbed eating, it could be crucial to evaluate the impact of the intervention in a natural setting without strictly defined inclusion and exclusion criteria.

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